Exhibit J

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/059,248	05/07/93	STILP	L ACOM0001

EXAMINER
ISSING, G

ART UNIT	PAPER NUMBER
2202	5

DATE MAILED: 09/24/93

22M2/0924

ALBERT W. PRESTON, JR.
WOODCOCK, WASHBURN, KURTZ, MACKIEWICZ AND NORRIS
ONE LIBERTY PLACE, 46TH FLOOR
PHILADELPHIA, PA 19103

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☑ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☑ Notice of References Cited by Examiner, PTO-892.
2. ☑ Notice re Patent Drawing, PTO-948.
3. ☑ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, Form PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☑ Claims 1 – 45 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☑ Claims 1-3, 5, 12-20, 44 are rejected.
5. ☑ Claims 4, 6-11, 41-43 and 45 are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable. ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed on _____, has been ☐ approved. ☐ disapproved (see explanation).
12. ☐ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

A 145

EXAMINER'S ACTION

PTOL-326 (Rev. 9-89)

1. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> Subject matter developed by another person, which qualifies as prior art only under subsection (f) and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

Claims 1-3, 5, 12-39 are rejected under 35 U.S.C. 103 as being unpatentable over Sagey in view of Song.

Sagey teaches the subject matter substantially as claimed including a plurality of cell cites 13, 20-26 receiving signals from multiple mobile cellular telephones 11-12, a regional location processing center 16 for receiving and processing time of arrival signals received from the cell cites in response to the location message 28 of a mobile cellular telephone, and subscriber interface means adapted for providing the computed location information to other subscribers. Sagey teaches the location message 28 being overlaid over the existing voice signals without sacrificing voice channel capacity or undue interference. Song teaches that it is well-known in cellular telephone networks, which are combined with locating and tracking a cellular telephone, to initiate the location system using the signals transmitted on the control channels. Thus, it owuld have been obvious to one having ordinary skill in the art

ath the time the invention was made to modify Sagey by using a control channel signal to make a determination of the location rather than overlaying the voice channel with a spread spectrum signal in view of the teachings of Song who teaches the conventionality of such. Sagey sets forth use in vehicle location, messaging services, emergency SOS information and vehicle anti-theft services. Thus, the particulars of the data message of the claimed subject matter are obvious to one having ordinary skill in the art since merely the information transmitted is different.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention."

The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an enabling disclosure.

Claims 6 and 40 are not understood since it is not understood how the cross-correlation of the demodulated signal and reconstructed signal provide the time difference of arrival particularly since it is not clear how the reconstructed signal of the originally transmitted signal is determined.

Claims 6, 40 and 44 are rejected under 35 U.S.C. 112, first paragraph, for the reasons set forth in the objection to the specification.

3. Claims 4, 6-11, 41-43 and 45 are objected to as being dependent upon a rejected base claim, but would be allowable if

rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Anderson et al disclose a cellular telephone locating system using time difference of arrivals.

Fuller discloses a system for locating mobile surfaces using tone bursts.

Buhl et al disclose a system for locating a cellular telephone wherein the homw exchange includes a list of a plurality of possible exchanges in which the mobile subscriber may be located.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Gregory C. Issing whose telephone number is (703)-308-0467. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703)-308-0766.

Gregory C Issing

GREGORY C. ISSING
PRIMARY EXAMINER
ART UNIT 222

Exhibit K

PATENT 10/22/93

DOCKET NO.: ACOM-001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Louis A. Stilp, et al.

Serial No.: 08/059,248 Group Art Unit: 2202

Filed: May 7, 1993 Examiner: G. Issing

For: CELLULAR TELEPHONE LOCATION SYSTEM

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Michael D. Stein
Type or print name of person signing certification

Michael D. Stein 10-5-93
Signature Date

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Dear Sir:

AMENDMENT

In response to the Office Action dated September 24, 1993, please amend the application as follows.

IN THE CLAIMS

1. (Amended) A cellular telephone location system for determining the locations of multiple mobile cellular telephones each initiating periodic signal transmissions over one of a prescribed set of reverse control channels, comprising:

(a) at least three cell site systems, each cell site system comprising: an elevated ground-based antenna; a baseband convertor operatively coupled to said antenna for receiving cellular telephone signals transmitted over a reverse control channel by said cellular telephones and providing baseband signals derived from the cellular telephone signals; a timing signal receiver for receiving a timing signal common to all cell sites; and a sampling subsystem operatively coupled to said

timing signal receiver and said baseband convertor for sampling said baseband signal at a prescribed sampling frequency and formatting the sampled signal into frames of digital data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said cellular telephone signals were received; and

(b) a central site system operatively coupled to said cell site systems, comprising: means for processing said frames of data from said cell site systems to generate a table identifying individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell site systems; and means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.

---

22. (Amended) A ground-based cellular telephone system serving a plurality of subscribers possessing mobile cellular telephones, comprising:

(a) at least three cell sites equipped to receive signals sent by multiple mobile cellular telephones each initiating periodic signal transmissions over one of a prescribed set of reverse control channels;

(b) locating means for automatically determining the locations of said cellular telephones by receiving and processing signals emitted during said periodic reverse control channel transmissions; and

(c) database means for storing location data identifying the cellular telephones and their respective locations, and for providing access to said database to subscribers at remote locations.

31. (Amended) A method for determining the location(s) of one or more mobile cellular telephones periodically transmitting signals over one of a prescribed set of reverse control channels, comprising the steps of:

(a) receiving said reverse control channel signals at at least three geographically-separated cell sites;

(b) processing said signals at each cell site to produce frames of data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said frames were produced at each cell site;

(c) processing said frames of data to identify individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell sites; and

(d) determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.

32. (Amended) A method as recited in claim 31, further comprising the steps of storing, in a database, location data identifying the cellular telephones and their respective locations, and providing access to said database to subscribers at remote locations.

REMARKS

Claims 1-45 are pending in the application. Claims 1-3, 5, and 12-39 stand rejected under 35 U.S.C. § 103 as being directed to subject matter which is unpatentable over Sagey (U.S. Patent No. 5,218,618) in view of Song (U.S. Patent No. 5,208,756). Claims 6, 40, and 44 stand rejected under 35 U.S.C. § 112, first paragraph. Claims 4, 6-11, 41-43, and 45 have been declared by the Examiner to be allowable over the prior art. Claims 1, 23, 31, and 32 have been hereby amended. Reconsideration of the rejections under 35 U.S.C. §§ 103 and 112 is respectfully requested in view of the above amendment and the below remarks.

Exhibit L

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/059,248	05/07/93	STILP	ACOM0001

EXAMINER
ISSING, G

22M2/1029

ALBERT W. PRESTON, JR.
WOODCOCK, WASHBURN, KURTZ, MACKIEWICZ
AND NORRIS
ONE LIBERTY PLACE, 46TH FLOOR
PHILADELPHIA, PA 19103

ART UNIT	PAPER NUMBER
2202	8

DATE MAILED: 10/29/93

NOTICE OF ALLOWABILITY

PART I.

1. ☑ This communication is responsive to Amdt A filed 10/5/93
2. ☑ All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
3. ☐ The allowed claims are 1-45
4. ☐ The drawings filed on _____ are acceptable.
5. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [_] been received. [_] not been received. [_] been filed in parent application Serial No. _____ filed on _____
6. ☐ Note the attached Examiner's Amendment.
7. ☑ Note the attached Examiner Interview Summary Record, PTOL-413. of 10/4/93
8. ☐ Note the attached Examiner's Statement of Reasons for Allowance.
9. ☐ Note the attached NOTICE OF REFERENCES CITED, PTO-892.
10. ☐ Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

1. ☐ Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
2. ☑ APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
   a. ☐ Drawing informalities are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. _____. CORRECTION IS REQUIRED.
   b. ☑ The proposed drawing correction filed on 10/13/93 has been approved by the examiner. CORRECTION IS REQUIRED.
   c. ☐ Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
   d. ☑ Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:
- _ Examiner's Amendment
- _ Examiner Interview Summary Record, PTOL-413
- _ Reasons for Allowance
- _ Notice of References Cited, PTO-892
- _ Information Disclosure Citation, PTO-1449
- _ Notice of Informal Application, PTO-152
- _ Notice re Patent Drawings, PTO-948
- _ Listing of Bonded Draftsmen
- _ Other

Gregory C. Issing

GREGORY C. ISSING
PRIMARY EXAMINER
ART UNIT 222

A 153

PTOL-37 (REV. 4-89) ★

USCOMM-DC 89-3789

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: Box: ISSUE FEE
COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

#9

22M2/1029

ALBERT W. PRESTON, JR.
WOODCOCK, WASHBURN, KURTZ, MACKIEWICZ
AND NORRIS
ONE LIBERTY PLACE, 46TH FLOOR
PHILADELPHIA, PA 19103

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

☐ Note attached communication from the Examiner.
☐ This notice is issued in view of applicant's communication filed _____

SERIES CODE/SERIAL NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT		DATE MAILED
08/059,248	05/07/93	045	ISSING, G.	2202	10/29/93

First Named Applicant: STILP, LOUIS A.

TITLE OF INVENTION: CELLULAR TELEPHONE LOCATION SYSTEM

	ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2	ACOM0001	342-387.000	Z99	UTILITY	YES	$585.00	01/31/94

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY Status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:
A. If the Status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
B. If the Status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:
A. Pay FEE DUE shown above, or
B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B of this notice should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by a charge to deposit account, Part B should be completed and returned. If you are charging the ISSUE FEE to your deposit account, Part C of this notice should also be completed and returned.

III. All communications regarding this application must give series code (or filing date), serial number and batch number. Please direct all communications prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees.

PTOL-85 (REV 12-88)(OMB Clearance is pending)

PATENT AND TRADEMARK OFFICE COPY

A 154

Exhibit M

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.	)	Civil Action
Plaintiff,	)	No. 05-747
vs.	)	
ANDREW CORPORATION,	)	
Defendant.	)	

VIDEOTAPED DEPOSITION OF

ANDREW BECK

Reston, Virginia

Friday, September 22, 2006

9:05 a.m.

Job No.: 22-87165

Pages 1 through 318

Reported by: John L. Harmonson, RPR, CCR

A 155

current employer sells?

MS. WALDRON: Objection.

THE WITNESS: My current employer sells thousands of products.

BY MR. MILCETIC:

Q. The Network Solutions Division, what does it sell?

A. Network Solutions sells hundreds of products. They are related to test equipment; they're related to engineering services; related to location systems as well.

Q. Does the current Network Solutions Divisions sell Geometrix?

A. Yes, Geometrix is a product.

Q. What is Geometrix?

A. Geometrix is a brand name for location systems and services that are offered by -- by Andrew.

Q. What type of location services and systems?

A. We build and offer a PDE. We offer SMLCs, SASs, GMLCs.

Q. And when was the first time that you started working or designing such location

09:19:43 1
09:19:50 2 equipment?
09:19:54 3 A. You mean in the context of Andrew
09:19:56 4 Corporation?
09:19:58 5 Q. In any context.
09:20:02 6 A. I began working on location equipment
09:20:13 7 for U.S. government contracts probably in the
09:20:15 8 1995-1996 time period.
09:20:17 9 Q. Was that for E-Systems?
09:20:18 10 A. No.
09:20:19 11 Q. Was that for Raytheon?
09:20:26 12 A. Yes.
09:20:31 13 Q. How did you come to work for the
09:20:36 14 Grayson Wireless Division of Allen Telecom?
09:20:42 15 A. In 1997, Raytheon sold off its
09:20:46 16 intellectual property for some of its location
09:20:51 17 products to Allen Telecom. As part of that sale,
09:20:55 18 four people went with the product from Raytheon to
09:20:56 19 Allen Telecom.
09:20:59 20 Q. At that point, what was your title with
09:21:01 21 Raytheon?
09:21:03 22 A. I believe it was senior systems
09:21:07 23 engineer at that point.
09:21:09 24 Q. What were your responsibilities as
25 senior systems engineer at Grayson at that time?

09:21:22 A. When we joined Grayson, our -- my responsibilities were to provide overall systems design engineering to help move the products and technology that had been acquired from Raytheon into a commercial arena to, at that time, support the FCC's 9/11 mandate on location of mobiles.

09:21:52 Q. What was Grayson Wireless Division's product for location of mobiles at that time?

09:21:58 A. At that time, we had no product that we were offering.

09:22:01 Q. What you were developing?

09:22:08 MS. WALDRON: Objection; foundation.

09:22:09 THE WITNESS: Can you be more specific on that question?

09:22:10 BY MR. MILCETIC:

09:22:11 Q. Were you working on a product that would eventually hit the market?

09:22:19 MS. WALDRON: Objection; vague.

09:22:19 THE WITNESS: Could you be more specific on the question?

09:22:22 BY MR. MILCETIC:

09:22:23 Q. Well --

09:22:24 A. I'm just --

Q. -- you weren't selling anything at that

Exhibit N

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

- - - - - - - - - - - - - - - - -*

TRUEPOSITION, INC., *

Plaintiff, *

vs. * C.A. No. 05-0747-SLR

ANDREW CORPORATION, *

Defendant. *

- - - - - - - - - - - - - - - - -*

Videotaped Deposition of ANDREW CORPORATION, through its representative, JOSEPH P. KENNEDY, JR.

Reston, Virginia

Monday, October 16, 2006

11:17 a.m.

Volume 1

Job No. 22-87715

Pages 1 - 146

Reported by: Karen Young

Videographer: Richard Fazio

16:25:17 connected to a GCS, GCS connected to an SMLC via Lbis.
16:25:24 The TDOA calculation function, the location estimation
16:25:29 function would reside in the GCS.
16:25:34 Q. And in the pricing list, that GCS was just
16:25:37 simply referred to as GMLC or SMLC?
16:25:42 A. That was page 83?
16:25:44 Q. Right.
16:26:03 A. I believe it's included in the GMLC SMLC
16:26:11 lines, so the base hardware line and the base software
16:26:21 line.
16:26:43 Q. As part of this proposal, is Andrew
16:26:46 Corporation offering ICT and SDCCH location license?
16:26:56 MS. PERNIC WALDRON: Objection, vague.
16:27:08 A. I don't believe the way the pricing or the
16:27:14 software licensing terms were described, it's culled
16:27:18 out explicitly.
16:27:22 Q. Could you turn to page 64 of Exhibit PX-109?
16:27:40 A. All right, I'm on page 64.
16:27:48 Q. You see where it says in Section 3.4.4,
16:27:58 "Because the target geolocation will be initiated via
16:28:01 an MT" dash "LT request" -- may be a typo or not, I
16:28:09 don't know. You see where it says the target can be
16:28:12 geolocated even if it is in idle mode?
16:28:14 A. I see that.

A 160

16:28:15 Q. If the target is in idle mode, would it be
16:28:21 transmitting on a stand-alone dedicated control
16:28:24 channel?
16:28:25 MS. PERNIC WALDRON: Objection, vague,
16:28:27 ambiguous.
16:28:32 A. If there is an MTLR request and the mobile
16:28:36 is in idle mode, it will be moved out of idle mode
16:28:41 into dedicated mode.
16:28:42 Q. Oh, is that right? Got you. And if it's in
16:28:46 dedicated mode, what channel, if any, will it be
16:28:50 transmitting on?
16:28:51 A. It will transmit on the SDCCH.
16:29:21 Q. Could we turn back to page 13 please of
16:29:24 PX-109, the Figure 2-1?
16:29:36 A. I'm on that page.
16:29:50 Q. If you don't mind, what I'd like you to do
16:29:52 is explain to the best of your knowledge how using
16:30:00 this figure in this proposal a signal transmission on
16:30:11 the SDCCH could be located using UTDOA. Will you be
16:30:23 willing to talk about that?
16:30:24 MS. PERNIC WALDRON: Object to the form of
16:30:25 the question, confusing and ambiguous.
16:30:28 A. Can you try again?
16:30:31 Q. Sure.

A 161

16:30:32 A. And I'll try if I can --

16:30:34 Q. Sure.

16:30:35 A. -- address it.

16:30:37 Q. In Figure 2-1 on page 13, you said that that describes an architecture of this proposal to ICT, right?

16:30:44

16:30:45 A. The figure is the system architecture for the proposal to ICT.

16:30:49

16:30:51 Q. Could you describe using that system architecture diagram the steps that would go into a UTDOA geolocation result?

16:30:57

16:31:03

16:31:08 MS. PERNIC WALDRON: Objection, compound, calls for a narrative.

16:31:10

16:31:27 A. I can try.

16:31:31 Q. Well, actually, let me kind of step you through it. Maybe that will probably be better rather than you doing a narrative. Is that okay?

16:31:33

16:31:36

16:31:40 A. That will be fine.

16:31:41 Q. The system proposed to ICT is a system for locating mobile phones, right?

16:31:48

16:31:52 A. That's correct.

16:31:53 Q. Including mobile phones transmitting on a stand-alone dedicated control channel, right?

16:31:57

16:32:00 A. Yes.

Exhibit O

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	Civil Action
	)	No. 05-747
ANDREW CORPORATION,	)	
	)	
Defendant.	)	
	)	

VIDEOTAPED DEPOSITION OF JOSEPH P. KENNEDY, JR.

Reston, Virginia

Thursday, October 17, 2006

2:26 p.m.

(Personal Deposition)

Job No. 22-87708

Pages 1 - 81

Reported by: Carl W. Girard, Notary Public

Videographer: Richard Fazio

December 2004 bid comply with?

MS. WALDRON: Objection, overbroad, ambiguous.

A. I can't state that from memory.

BY MR. MILCETIC:

Q. Is that information in the bid itself?

A. I don't recall. There was a standards compliance table in the bid. I don't know -- I don't know whether we referenced anything specific to 3GPP.

Q. Are you aware of any efforts that anyone at Andrew engaged in to make Geometrix compliant with any 3GPP standard?

MS. WALDRON: Objection, overbroad, speculation, form.

A. Yes.

BY MR. MILCETIC:

Q. What efforts?

MS. WALDRON: Objection, form.

A. Shortly after Andrew introduced GSM compliant version of Geometrix we began to work in concert with others to create standards and as the standards formed to the point where we could built to them, we built to them.

JOSEPH P. KENNEDY, JR.

BY MR. MILCETIC:

15:09:11 Q. When did these efforts to make Geometrix standards compliant begin?

15:09:16 A. I don't know the exact date.

15:09:19 Q. Are they ongoing?

15:09:22 A. Certainly features in 2000.5.X have been toward standards compliant features. Whether there are features in 2006 and beyond that are directed towards standards compliance, I don't know.

15:09:39 Q. Earlier today in connection with a 30(b)(6) deposition we were talking about SDCCH location. Do you remember that?

15:09:47 A. Yes.

15:09:49 Q. Is it your understanding that SDCCH location is needed to comply with any standard?

15:09:54 MS. WALDRON: Objection, vague, ambiguous. Calls for a legal conclusion.

15:09:58 A. In the standard that deals with location services for GSM, MTLR idle mode is called out as one of the sanction methods and the method that's called out to accomplish it is to place the mobile in dedicated mode from idle mode and to transmit on the SDCCH.

15:10:01 BY MR. MILCETIC:

15:10:05

15:10:07

15:10:08

15:10:12

15:10:15

15:10:16

15:10:22

15:10:30

15:10:40

15:10:43

15:10:50

15:10:55

A 165

JOSEPH P. KENNEDY, JR.

15:10:57 Q. Is it called out to transmit on the
15:11:01 SDCCH or the SDCCH and the traffic channel or the
15:11:07 traffic channel?
15:11:21 A. I know it's called out to transmit on
15:11:23 the SDCCH. I don't know if it's called out to
15:11:27 transmit on the traffic channel.
15:11:36 Q. Could you summarize for me what you
15:11:39 would have done differently had TruePosition
15:11:43 disclosed its intellectual property to ETSI?
15:11:49 MS. WALDRON: Objection. Calls for a
15:11:50 narrative, overbroad. Asked and answered.
15:11:54 A. I can't do that here today.

BY MR. MILCETIC:

15:11:58 Q. Why not?
15:12:01 A. Because I haven't had time to think
15:12:07 about it, it's obviously a very important decision.
15:12:08 I haven't had a chance to consult with anybody else
15:12:10 in the company about their feelings or ideas. I'm
15:12:15 displaced in time from when I may have learned
15:12:19 that. I may have taken different positions at
15:12:23 different points in time so it's very difficult for
15:12:26 me on the spot to tell you what I would have done.
15:12:30 Q. Are you suggesting that perhaps a month
15:12:34 from now and you're deposed in your Rule 30(b)(6)

15:12:37 capacity that you will be able to tell me what you
15:12:40 would have done?
15:12:41 MS. WALDRON: Objection,
15:12:42 mischaracterizes.
15:12:47 A. If I took time to think about it, I may
15:12:50 have been able to tell you what I would have done
15:12:54 given what I know today, but...
BY MR. MILCETIC:
15:12:58 Q. How much time would you need?
15:12:59 MS. WALDRON: Objection, improper form.
15:13:02 A. I don't know.
BY MR. MILCETIC:
15:13:03 Q. If we gave you 90 seconds to think about
15:13:06 what you would have done differently had
15:13:10 TruePosition disclosed its intellectual property,
15:13:12 would you be able to tell us?
15:13:14 MS. WALDRON: Objection, impractical
15:13:16 hypothetical because TruePosition didn't
15:13:18 disclose its intellectual property, form.
15:13:20 A. I couldn't.
BY MR. MILCETIC:
15:13:21 Q. So sitting here today, you can't tell me
15:13:25 what you believe you would have done differently
15:13:28 had TruePosition disclosed the 144 patent to ETSI;

Exhibit P

CAPACITY ANALYSIS OF THE GSM SHORT MESSAGE SERVICE

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ABSTRACT

We present a simple queueing model to analyze the SMS capacity of a GSM cellular network. The analysis is based on a detailed study of GSM channels and their usage by SMS and other traffic. We saw that SMS is sent on the same control channels that are used by voice call set-up and location updates. Our results show that if SMS volumes continue to increase dramatically, the control channels used by SMS can become a bottleneck, thus increasing the blocking probability of SMS as well as voice calls.

I. INTRODUCTION

The GSM mobile telephony system provides text messaging through an extremely popular service called the *Short Message Service (SMS)*. The number of GSM users worldwide has exceeded 900 million and the number of SMS messages exchanged each month is approximately 15 billion. In India SMS usage is increasing rapidly as more and more innovative uses are being found, such as contests, shopping and location based services. Apart from good volumes on normal days, SMS usage in India and abroad reaches abnormally high peaks on special days such as the New Year and other popular festivals.

A natural question that arises when one sees such phenomenal usage of a service is: What happens to the performance of this service, as volumes increase beyond expectations? Or, how are *other* services that are provided on the same network affected, with increasing SMS usage? The work described here tries to answer these questions.

The main contributions of this paper are: 1) A comprehensive description of the SMS within GSM, including details of GSM channel assignment, which is the key to understanding SMS capacity of a GSM network, 2) Identification of traffic that contends with SMS for the same resources, and 3) Running some what-if scenarios using the Erlang blocking model for SMS capacity.

In the following, Section 2 provides an overview of the short message service. Section 3 provides details of GSM channel assignment for SMS and other traffic. Section 4 describes the model and Section 5 some results. We conclude the paper in Section 6.

II. SERVICE DESCRIPTION

SMS offers two types of service: One is the cell broadcast service in which a message is sent to all Mobile Subscribers (MS) in the cell that are subscribed to the particular service. The other is a point-to-point (PTP) service in which individual mobile subscribers send and receive messages of limited size from their GSM mobiles. In this work we are concerned with the latter. The point-to-point short message service can be either Mobile originated (MO-SM) or Mobile Terminated (MT-SM). Mobile originated short messages are transported from an MS to the short message Service Center (SC). MT-SMs are transported from the SC to the handset.

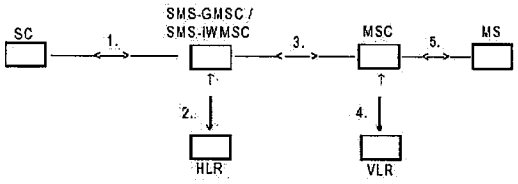

Fig. 1. **Network Elements and Architecture**

The network elements involved in the transfer of short messages are shown in Figure 1. The figure shows the sequence of steps involved in delivering a MT-SM to an MS. A MT-SM will start from the SC, then will be forwarded to a Gateway MSC (Mobile Switching

Centre), which will locate the MS by querying the Home Location Register (HLR), forward it to the appropriate MSC, which in turn queries the Visitor Location Register (VLR) for subscriber information, and then delivers the message to the MS. The final delivery of the message is through GSM channels, the capacity of which is the focus of this paper, and described next.

III. GSM LOGICAL AND PHYSICAL CHANNELS

GSM uses a large number of logical channels which are mapped onto the physical channels in the radio path [1]. The logical channels consist of two groups: the traffic channels (TCH) and the control channels. The latter consist of broadcast control (BCCH), common control (CCCH) and dedicated control (DCCH) channels. SMS messages are carried in the dedicated control channels of the network.

The BCCH is a one-to-many unidirectional control channel for broadcasting information from the Base Station (BS) to the MSs. The CCCH is a point-to-multipoint bidirectional control channel primarily intended to carry signaling information necessary for access management. It includes (1) a downlink *Paging Channel* (PCH) for paging MSs (2) an uplink *Random Access Channel* (RACH) used for requesting assignment of a DCCH and (3) a downlink *Access Grant channel* (AGCH) used to assign an MS to a specific DCCH.

A DCCH is a point-to-point, directional control channel which consists of a *stand alone dedicated control channel* (SDCCH) and the *associated control channel* (ACCH). The SDCCH is used before the MS is assigned a TCH. It is used to provide authentication to the MS, for voice call setup and location updates, and assignments of TCHs. It is also used for system signaling during idle periods. A *slow associated control channel* (SACCH) can be linked to either a TCH or an SDCCH. This is a continuous data channel carrying information from the mobile, such as measurement reports of received signal strength.

III-A. Usage of GSM Channels by Different Services

The GSM logical channels are used in different ways by different services. We describe below only those services, that require channels that are also used by the SMS.

1. Voice Call Setup - Voice calls are either mobile originated (MO) or mobile terminated (MT). For MO calls, the MS sends a signaling channel request to the network through the RACH. If a SDCCH is available, the BSC (Base Station Controller) informs the MS of the allocated signaling channel (SDCCH) through the AGCH. Figure 2 shows the complete sequence of control messages exchanged on various logical channels during the setup of a MO voice call [2] (in the figure, BTS denotes Base Transceiver Station). In case of MT calls, the request for a signaling channel is the result of a paging request by the BS on the PCH. The rest of the control messages follow a similar pattern.

Steps	Channel	MS	BTS	BSC	MSC
1. Channel Request	RACH				
2. Channel Assigned	AGCH				
3. Call Establishment Request	SDCCH				
4. Authentication Request	SDCCH				
5. Authentication Response	SDCCH				
6. Ciphering Command	SDCCH				
7. Ciphering Ready	SDCCH				
8. Send Destination Address	SDCCH				
9. Routing Response	SDCCH				
10. Assign Traffic Channel	SDCCH				
11. Traffic Channel Establishment	FACCH				
12. Available/Busy Signal	FACCH				
13. Call Accepted	FACCH				
14 Connection Established	FACCH				
15. Information Exchange	TCH				

Fig. 2. **Mobile Originated Voice Call Setup**

2. Location Update - The location information of each mobile is stored in the HLR and VLR at the MSC. Whenever a mobile is switched on or when it moves from one location area to another, it needs to send that information to the MSC so that the MS can be contacted whenever needed. The sequence of messages exchanged are the same as in Figure 2 except that no traffic channel is assgined and the location update continues on the SDCCH after authentication, ciphering and routing.

3. *SMS* - SMS messages are carried on either SDCCH or SACCH [3] depending on the use of the traffic channel. When the TCH is not allocated, i.e., no voice call or data transfer in progress, the short message is carried on the SDCCH.

If a TCH is allocated before a short message transfer starts, the short message uses the SACCH associated with the TCH. If a TCH is allocated during a short message transfer on an SDCCH (i.e., a voice call or data transfer starts during short message transfer), the

short message transaction stops and continues on the SACCH associated with the TCH. If the voice call or data transfer ends during short message transfer, the short message may either continue on the SACCH associated with the TCH or may stop and continue on a SDCCH.

Once again, the sequence of messages exchanged is similar to that of the voice call setup in Figure 2. In the case of SMS message transfer when a traffic channel is not allocated, the SDCCH is not released after authentication, ciphering and routing but is retained for sending or receiving the message. The time for which the SDCCH channel is held, is calculated in Section 4.

III-B. Channel Allocation in a Cell

Each operator in a cellular area is given a part of the total available frequency bands. The operator divides these allocated frequency bands between the cells in the cluster. Thus, each cell has n (duplex) carriers, named $C0$, $C1$,..., Cn and each carrier has 8 timeslots numbered $TN0$, $TN1$,..., $TN7$. Each combination of a frequency band number and a timeslot number in that band represents a physical channel. Of the total physical channels in a cell, a few are reserved for control channels and the remaining are used for sending and receiving user data i.e., as traffic channels.

Channel $(C0, TN0)$ in a cell is always used for control information. The BCHs are mapped on to this channel, sometimes in combination with other channels. Apart from this control channel, there can be at most three others on which CCCHs are mapped (TN2, TN4, TN6). This number is decided by the operator.

The remaining control channels have SDCCH and associated SACCH. These are not restricted to being allocated either on one of the remaining timeslots on C0 or on TN0 in one of the other frequency bands. Each such channel can serve 8 users (Figure 3).

The GSM logical channels can be mapped onto a physical channel according to some permitted rules [4]. The dedicated control channels SDCCH can be mapped onto physical channels in the following ways.

- FCCH + SCH + BCCH + CCCH + SDCCH/4(0...3) + SACCH/C4(0...3)
- SDCCH/8(0 ..7) + SACCH/C8(0 .. 7)

where SACCH/C is the SACCH associated with SDCCH and the numbers appearing in parenthesis after channel designations are sub-channel numbers.

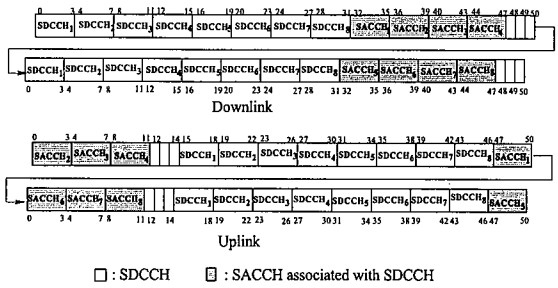

Fig. 3. **Time Organization of SDCCH and associated SACCH**

There are 51 frames in all (one timeslot TN0 in each frame) forming a control multiframe which lasts for 235.5 ms. 26 control multiframes make up a superframe and 2048 superframes constitute a hyperframe.

The SDCCH occupy 32 slots in the 51 TDMA frame control multiframe in eight groups of 4 slots each, each group serving a different user (Figure 3). We focus on SMS messages that are sent on these SDCCH.

In the following section we model SDCCH as the bottleneck resource for which multiple types of GSM traffic contend. As we shall see, the detailed understanding of control channels and their realization in terms of specific timeslots in control multiframes will be used to derive model parameters such as channel holding times.

IV. SMS CAPACITY MODEL

In the previous section we described the sources of traffic that SMS messages contend with namely, voice call setup messages and location updates. We now create a simple queueing model to find the primary measure of interest for a *loss system* like this one - namely, the *blocking probability*. This is the probability that an arriving message will find all channels that it can use, busy, and is an important quality of service measure for SMS and other services that use SDCCH, including voice calls.

IV-A. Model Description

We construct an *Erlang Loss System* ([5]) to model the network since blocked messages are lost, not delayed, in a cellular network. The model is for a single cell in a GSM system and a single operator in the cell.

We model only the control channels which have SD-

CCH mapped onto them. As discussed earlier, each physical channel can have either eight or four SDCCH subchannels, depending upon the organization of control channels. Each of these subchannels serves a different user. In practice, GSM systems do not necessarily allocate SDCCH statically, so the number of "servers" in our queueing model will be variable. We denote this number by s.

Let λ_{sms}, λ_l and λ_v be the arrival rates for SMS messages, location updation and voice call setup respectively. The arrival processes of all the three types of requests are assumed to be Poisson([5]). The maximum size of a single SMS message can not exceed 160 characters (140 octets). (This restriction comes from the MAP protocol of GSM [6].) A message of larger size is broken into fragments of size not exceeding 160 characters. We assume that each of these fragments is treated as a separate SMS message by the system; i.e. after sending one fragment, the SDCCH channel is released. Clearly, a message with size greater then 160 characters is considered to be sent successfully only if all the fragments into which it has been broken have been sent successfully. The effective arrival rate used in the Erlang loss system is then equal to the actual message arrival rate multiplied by the average number of fragments that a message is broken into.

We would like to note here some assumptions made for building the model. First, we assume that the SDCCH is the bottleneck resource, and model only those, although the CCCHs are also needed for sending an SMS message. We also ignore SMS messages that are sent or received while a voice call is in progress, since they use a different channel (SACCH associated with the TCH). Second, we do not model TCH channels explicitly, although blocking a TCH channel will result in re-attempts and therefore, a higher volume of call-setup requests, which will affect our model. Third, SMS message arrivals are assumed to be a Poisson, even though larger messages are sent in fragments and such bulk arrivals are not modeled accurately by the Poisson assumption.

IV-B. Blocking Probability

We model the SDCCH channels as an $M/G/s$ queue with a single "aggregated" customer type. The arrival rate of this aggregate traffic that uses SDCCH channels is given by: $\lambda_c = \lambda_{sms} + \lambda_l + \lambda_v$.

Let the mean service time (i.e. channel holding time) for a single SMS message be μ_{sms}^{-1}, and that of location updation and voice call setup messages be ${\mu_l}^{-1}$ and ${\mu_v}^{-1}$ for respectively.

The unconditional expected service time of an arriving message is then given by ${\mu_c}^{-1} = \frac{\lambda_{sms}}{\lambda_c} \times \mu^{-1} + \frac{\lambda_l}{\lambda_c} \times {\mu_l}^{-1} + \frac{\lambda_v}{\lambda_c} \times {\mu_v}^{-1}$.

The blocking probability, for an $M/G/s$ system, denoted by $B(s,a)$, where $a = \lambda_c/\mu_c$ is then given by ([5]) $B(s,a) = \frac{a^s/s!}{\sum_{k=0}^{s} a^k/k!}$.

Since all the three job streams are assumed to be Poisson, the blocking probability, B, for each of the three jobs is same and equal to $B(s,a)$. We also model re-attempts on blocking, by assuming that everytime a request is blocked, it is re-attempted with probabillity r. With re-attempts, the *effective* arrival rate, λ_{eff} of a stream which has arrival rate of new requests = λ, is given by $\lambda_{eff} = \lambda/(1 - rB)$. This gives rise to a set of interdependent equations, which can be solved iteratively until convergence is achieved.

The blocking probability for a "message" is then given by $B_{message} = 1 - (1 - B)^n$, where n is the number of fragments that a message is split into.

IV-C. Model Parameterization

In the absence of actual data from cellular operators, we "derived" various model parameters judiciously, as described below.

Assuming that about one million SMS messages [7] are sent and received in Mumbai daily by an operator and that there are about 50 cells, the number of SMS messages per cell per second is 0.55 (=1000000/(3600$\times$ 10 $\times$ 50)) (assuming that most of the SMS messages are sent in 10 hrs during the day). Assuming that the number of voice calls are about 12 times[8] as many as SMS messages we have $\lambda_v = 6.6$. We simply assume that location updates are about 10% of this volume of SMS messages, giving us, λ_l= 0.05 per cell per second.

Since the GSM connect time requirement for voice calls is less than 4 seconds [4], we assume that the voice call setup part takes 0.5 seconds, i.e., ${\mu_v}^{-1} = 0.5$ on the SDCCH. In case of location updates, we assume an additional 0.1 second of use of the SDCCH (Section III), bringing the total to ${\mu_l}^{-1} = 0.6$.

Recall from the previous section that a control multiframe has 4 SDCCH slots for each user. The total data that can be carried on these four slots is 456 bits

(4×114 [4]). But for a signaling channel, 184 bits of data is encoded into 456 bits [2]. So, the 4 SDCCH slots carry 184 bits of actual data. An SMS message of size c characters, contains $c \times 7$ bits (7-bit ASCII encoding), to transfer which we need about $(c \times 7)/184$ control multiframes. Recalling that a control multiframe is 235.5 ms in length, the total time required for transfering $7c/184$ multiframes is approximately $9c$. So, the time needed to send an SMS message of c characters is $9c$ ms plus the setup time. We assume the latter to be the same as that for voice call setup (0.5 seconds).

V. RESULTS

Figure 4 (top) shows the blocking percentage of the message *vs* arrival rate of messages (starting at 0.55 messages per second), for different values of the number of SDCCH subchannels while keeping all other parameters constant (average SMS message size is assumed to be 70 characters, and retry probability is set to 0.3). The graph provides some useful insights. For example, when $s = 12$, the blocking increases by an order of magnitude, if the SMS volume quadruples (SMS traffic on peak days in India was reported to be four times average SMS traffic). We also observe that blocking reduces by four orders of magnitude when the number of channels increases four-fold.

Figure 4 (bottom) shows the blocking probability of the message *vs* average size of the message. The arrival rate was fixed at 0.55 messages per second. If average message size is c characters, this translates to $(c/160) \times 0.5$ as the SMS arrival rate. We can see the jump in blocking after 160 characters - this is clear from the definition of blocking of messages longer than 160 characters.

VI. CONCLUSIONS

We conclude from our work that the effect of increasing volumes and sizes of SMS messages on cellular call performance can be significant. SMS uses a resource that is shared by other very important control messages (especially, voice call set-up), and our "what-if" analysis suggested that control channels might indeed become bottlenecks if SMS volume continues to grow dramatically. The main work remaining is validating model parameters using data from cellular operators. An end-to-end delay analysis of SMS would also be an interesting study.

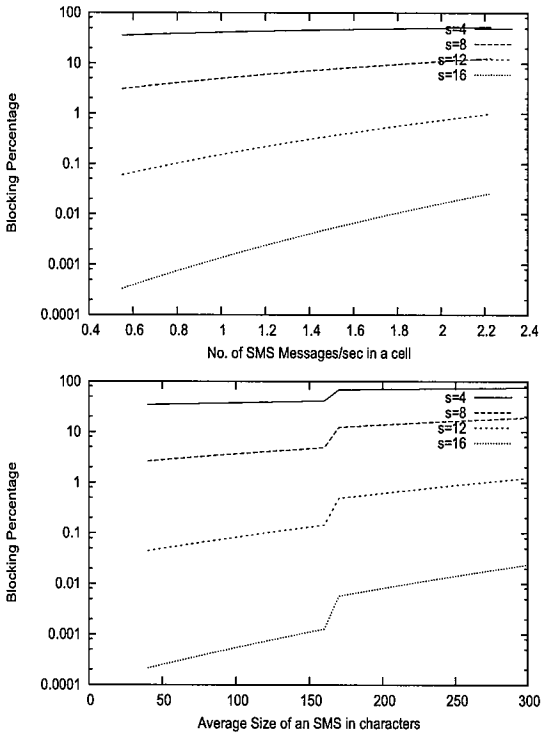

Fig. 4. Blocking vs SMS Arrival Rate and Average Message Size

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Exhibit Q

W-CDMA: Mobile Communications System.
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W-CDMA
MOBILE COMMUNICATIONS SYSTEM

W-CDMA Mobile Communications System

Supervising Editor: Keiji Tachikawa

NTT DoCoMo became the first in the world to launch a next-generation mobile phone service that enables large-capacity communications. The W-CDMA mobile communications technology, known as one of the third-generation standard, was adopted to realize this high-speed, high-quality service. This volume, the fruit of collective efforts made by engineers engaged in R&D at NTT DoCoMo, is a standard technical documentation describing the basic technologies that constitute the W-CDMA mobile communications system in detail and individual systems that are expected to play an important role in future implementations.

W-CDMA

MOBILE COMMUNICATIONS SYSTEM

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Table 3.2 List of transport channels

Name of physical channel	Application
DCH (Dedicated CHannel)	A bidirectional channel used for transmitting user data. Assigned individually to each UE. Able to vary the rate and control the power at high speed.
BCH (Broadcast CHannel)	A downlink common channel for transmitting broadcast information (e.g. system information, cell information). BCH is transmitted at a fixed rate.
FACH (Forward Access CHannel)	A downlink common channel used for transmitting control information and user data. Shared by multiple UEs. Used for low-rate data transmissions from the higher layer.
PCH (Paging CHannel)	A downlink common channel used for transmitting paging signals.
RACH (Random Access CHannel)	An uplink common channel used for transmitting control information and user data. Applied in random access, and used for low-rate data transmissions from the higher layer.
CPCH (Common Packet CHannel)	An uplink common channel used for transmitting user data. Applied in random access, and used primarily for high-rate, bursty data transmissions.
DSCH (Downlink Shared CHannel)	A downlink common channel used for transmitting packet data. Shared by multiple UEs. Used primarily for high-rate data transmissions.

Table 3.3 List of physical channels

Name of physical channel	Application
DPCH (Dedicated Physical CHannel)	A bidirectional uplink/downlink channel, assigned individually to each UE. Consists of the Dedicated Physical Data CHannel (DPDCH) and the Dedicated Physical Control CHannel (DPCCH). For downlink, DPDCH and DPCCH are time-multiplexed in the time slot; for uplink, they are mapped to I phase and Q phase, respectively.
DPDCH (Dedicated Physical Data CHannel)	At least one DPDCH is assigned to each UE using DPCH. Used for transmitting data from the higher layer.

(*continued overleaf*)

can reallocate radio resources and change MAC parameters in response to instructions from RRC. MAC also has the function to measure the traffic volume and quality, and inform RRC of the measurement results.

3.3.2.1 Logical Channel

MAC provides data forwarding functions different from RLC as a logical channel. MAC handles the mapping between the logical channels and the transport channels provided by Layer 1.

The logical channels can be divided into CCH, which are used for forwarding information in the control plane, and Traffic CHannels (TCH), which are used for forwarding user plane information. The available channels are as described in Table 3.13.

3.3.2.2 Mapping of Logical Channel and Transport Channel Support

Table 3.14 shows the mapping between logical channels and transport channels. Mapping is allowed only between the circled combinations of logical and transport channels.

3.3.2.3 Overview of MAC Functions

The functions of MAC are as follows.

(1) Mapping of Logical Channels and Transport Channels

MAC handles the mapping of logical channels and transport channels as described in Section 3.3.2.2.

Table 3.13 Logical channel

Category	Logical channel	Application
Control Channel (CCH)	Broadcast Control Channel (BCCH)	A downlink channel used for broadcasting system control information.
	Paging Control Channel (PCCH)	A downlink channel used for broadcasting paging information.
	Common Control Channel (CCCH)	A bidirectional channel used for transmitting control information between UE and the network. Used when there is no RRC connection or when accessing a new cell.
	Dedicated Control Channel (DCCH)	A bidirectional point-to-point channel used for transmitting dedicated control information between UE and the network. Established by RRC Connection Setup.
Traffic Channel (TCH)	Dedicated Traffic Channel (DTCH)	A bidirectional channel used for transferring user data, dedicated to one UE. Has both uplink and downlink.
	Common Traffic Channel (CTCH)	A uni-directional point-to-multipoint channel for broadcasting user data to all UEs or certain UEs.

Table 3.14 Mapping between logical channels and transport channel

Logical/Transport	BCH	PCH	CPCH	RACH	FACH	DSCH	DCH
BCCH	○	–	–	–	○	–	–
PCCH	–	○	–	–	–	–	–
CCCH	–	–	–	○	○	–	–
DCCH	–	–	○	○	○	○	○
DTCH	–	–	○	○	○	○	○
CTCH	–	–	–	–	○	–	–

(2) Selection of Transport Format Combination

MAC selects the adequate TFC for each transport channel from the Transport Format Combination Set (TFCS) specified by RRC. For RACH, MAC selects only the TF because there is no Layer 1 multiplexing of TFs.

(3) Priority Control

Upon the selection of the TF, MAC selects the TF that can transmit high-priority data on the basis of the ordering of priority according to the radio bearer attribute and RLC buffer status.

Also, MAC schedules data transmission between UEs on the common channel.

(4) Identification of UEs on Common Channel

MAC identifies UE with reference to UE-Id in the MAC header.

(5) Multiplexing and Demultiplexing to/from Transport Channels in RLC-PDU

MAC multiplexes and demultiplexes logical channels carried on the same transport channel using the MAC header.

(6) Observation of Traffic Volume

MAC measures the traffic volume according to the observation method specified by RRC for each transport channel and reports it to RRC.

(7) Switching Between Common and Dedicated Transport Channels

RRC switches between common and dedicated transport channels through MAC based on the measured traffic.

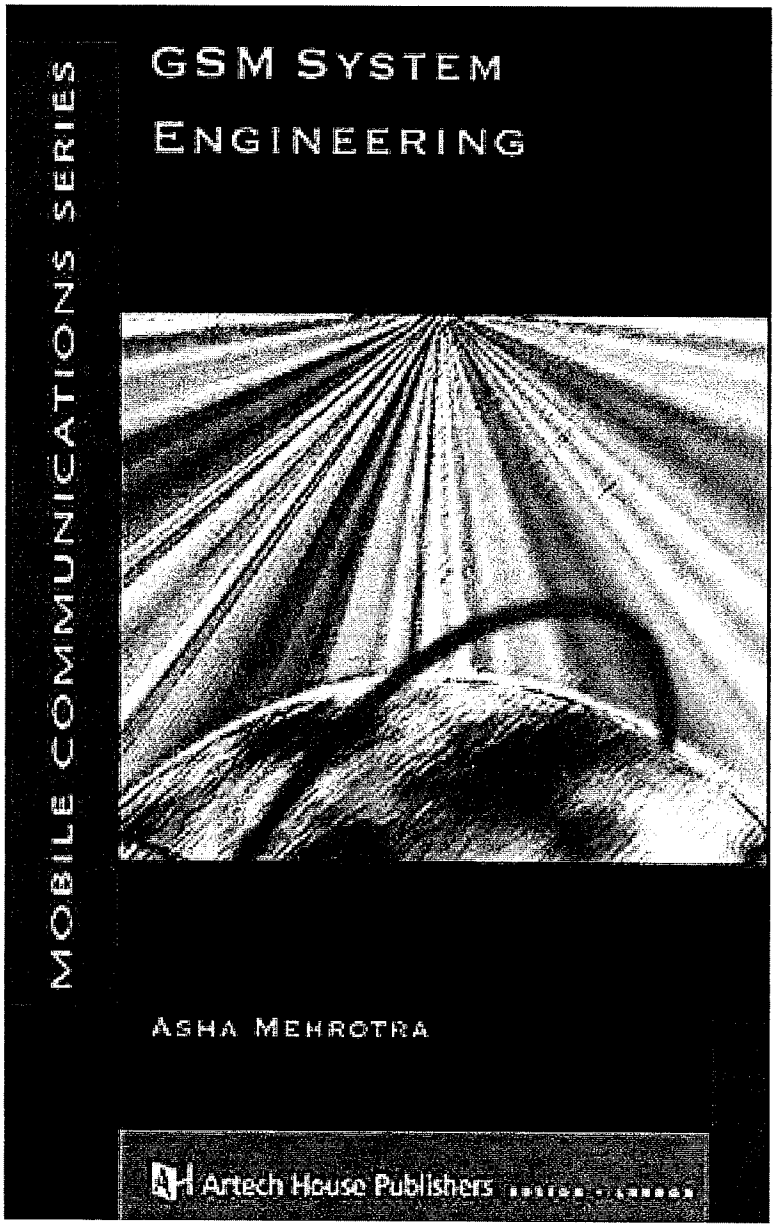
(8) Cyphering Process

MAC executes cyphering when Transparent Mode (TM) is used in RLC.

(9) Selection of Access Service Class (ASC) for RACH Transmission

MAC on the UE side controls and selects the Layer 1 PRACH resources (signature and access slots) and RACH parameters on the basis of ASC specified by RRC.

Exhibit R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9.6 Kbps, 4.8 Kbps, and 2.4 Kbps, which are padded to bring up the rates to 12 Kbps, 6 Kbps, and 3.6 Kbps.

A half rate TCH (TCH/H), L_m , carries information (encoded speech or data) at half of the full rate channel or at the gross rate of 11.4 Kbps. The user data rate associated with the half rate TCH are as follows. 4.8 Kbps and 2.4 Kbps. The allowed combinations of user data rate with full and half rate speech are as follows.

- Full rate speech (TCH/F);
- Half rate speech (TCH/H);
- 9.6 Kbps full rate data (TCH/F9.6);
- 4.8 Kbps full rate data (TCH/F4.8);
- 2.4 Kbps full rate data (TCH/F2.4);
- 4.8 Kbps half rate data (TCH/H4.8);
- 2.4 Kbps half rate data (TCH/H2.4).

3.2.3 Logical Control Channels

Most of the user services offered by GSM rely on the four transmission modes (single speech and three data modes). Control channels are intended to carry signaling or synchronization data. Three kinds have been defined below.

- *Broadcast Control Channel* (BCCH);
- *Common Control Channel* (CCCH);
- *Dedicated Control Channel* (DCCH).

Figure 3.4 shows details of different logical channels. The BCCH is a point-to-multipoint unidirectional control channel from the fixed subsystem to the MS that is intended to broadcast a variety of information to MSs, including information necessary for the MS to register in the system. The BCCH includes a *Frequency Correction Channel* (FCCH), which is used to allow an MS to accurately tune to a BS, and the *Synchronization Channel* (SCH), which is used to provide TDMA frame-oriented synchronization data to a MS. When mobile recovers both FCCH and SCH signals, we consider the synchronization to be complete.

A CCCH is a point-to-multipoint (bidirectional control channel) channel that is primarily intended to carry signaling information necessary for access management functions (e.g., allocation of dedicated control channels). The CCCH can include the following: (1) *paging channel* (PCH), which is a down channel used to page MSs; (2) *random access channel* (RACH), which is an uplink channel used for request assignment of a DCCH; and (3) *access grant channel* (AGCH), which is a downlink channel used to assign a MS to a specific DCCH.

A DCCH is a point-to-point, directional control channel. Two types of DCCHs are used: (1) *stand alone dedicated control channel* and (2) *associated control channel*

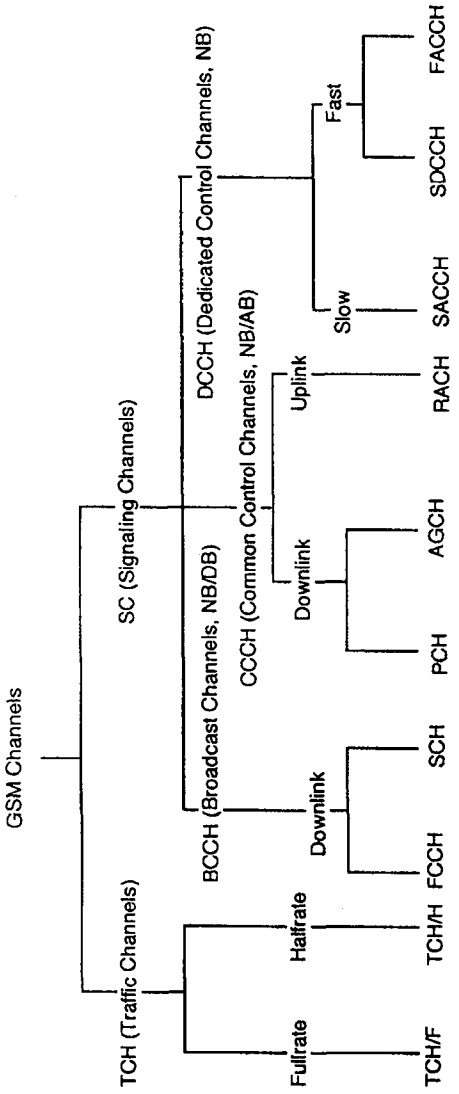

Figure 3.4 Logical channels in GSM.

(ACCH). Stand alone SDCCH is a DCCH whose allocation is not linked to the allocation of a TCH. This channel is used before the MS is assigned a TCH. The SDCCH is used to provide authentication to MS and for location updates and assignment to TCHs. A DCCH whose allocation is linked to the allocation of a TCH has ACCHs (that is, FACCH and SACCH). A FACCH or burst stealing is a DCCH obtained by preemptive dynamic multiplexing on a TCH. A SAACH, also known as a continuous data stream, is allocated together with a TCH or a SDCCH. We shall now provide details of each of these three groups of control channels.

3.2.3.1 Broadcast Control Channel

The BCCH provides general information on a per-BTS basis (cell-specific information) including information necessary for the MS to register in the system. After initially accessing the mobile, the BS calculates the required MS power level and sends a set of power commands on this channel. Other information sent over this channel includes country code, network code, local area code, PLMN code, RF channels used within the cell where the mobile is located, surrounding cells, hopping sequence number, mobile RF channel number for allocation, cell selection parameters, and RACH description. One of the important messages on a BCCH channel is CCCH_CONF, which indicates the organization of the CCCHs. From this parameter, the number of CCCHs (BS_CC_CHANS), indicating whether or not CCCHs are combined with four SDCCHs and four SACCHs on to the same physical channel called BS_CCCH_SDCCH_COMB = true or false, are derived as shown in Table 3.1.

Similarly, the 3-bit message BS_AG_BLKS_RES represents the number of blocks on each CCCH reserved for access grant messages. This channel is used to downlink point-to-multipoint communication and is unidirectional; there is no corresponding uplink. The signal strength of this channel is continuously measured by all mobiles, which may seek a handover from its present cell. Thus, it is always transmitted on a designated RF carrier (the "BCCH carrier") using timeslot 0, denoted as C0T0. This channel is never kept idle—either the relevant messages are sent or a dummy burst is sent. Other channels that belong to this group are the FCCH and SCH.

Table 3.1
CCCH Configuration Message Structure

CCCH_CONF	*BS_CC_CHANS*	*BS_CCCH_SDCCH_COMB*
000	1	false
001	1	true
010	2	false
100	3	false
110	4	false

is used to page (search) the MS in the downlink direction; and (2) a RACH, which is used by MS to request allocation of an SDCCH either as a page response from MS or call origination/registration from the MS. This is an uplink channel and operates in point-to-point mode (from MS to BTS). The channel operates on slotted Aloha Protocol and thus the contention possibility exists. If the mobile's request through this channel is not answered within a specified time, the MS assumes that a collision has occurred and repeats the request. Mobile must allow a random delay before reinitiating the request to avoid repeated collision.

The AGCH is used to allocate an SDCCH or a TCH directly to an MS. This channel is in the downlink direction and operates in point-to-point mode. A combined paging and access grant channel is designated as PAGCH, although the GSM specifications refer to PAGCH as two separate channels.

3.2.3.3 Dedicated Control Channels

DCCHs consist of a SDCCH and the ACCH. The SDCCH is used for system signaling during idle periods and call setup before allocating a TCH. For example, MS registration, authentication, and location update takes place through this channel. When a TCH is assigned to the MS, this channel is released. It uses 1/8 rate TCH (TCH/8); that is, its data rate is one-eighth of the full rate speech channel. This is achieved by transmitting data over this channel once every eighth frame. The channel is used for both up/downlink and is meant for point-to-point usage.

As stated, the SACCH can be linked to a TCH or an SDCCH. It is a continuous data channel carrying information, such as measurement reports, from the mobile of received signal strength for a serving cell as well as adjacent cells. This is a necessary channel for the mobile-assisted handover function. The channel is also used for power regulation of the MS and time alignment and is meant for both the up and downlink. It is used for point-to-point communication between mobile and BS.

A FACCH is associated to a TCH. FACCH works in a stealing mode. This means that if suddenly during a speech transmission it is necessary to exchange signaling information with the system at a rate much higher than the SACCH can handle, then 20-ms speech (data) bursts are stolen for signaling purposes. This is the case at handover. The interruption of speech will not be heard by the user since it lasts only for 20 ms and cannot be sensed by human ears. We shall now take up details of how the data is actually arranged within a physical channel for the logical speech and control channels.

3.2.4 Structure of a TDMA Slot With a Frame

There are five different kinds of bursts in the GSM system.

- Normal burst;
- Synchronization burst;

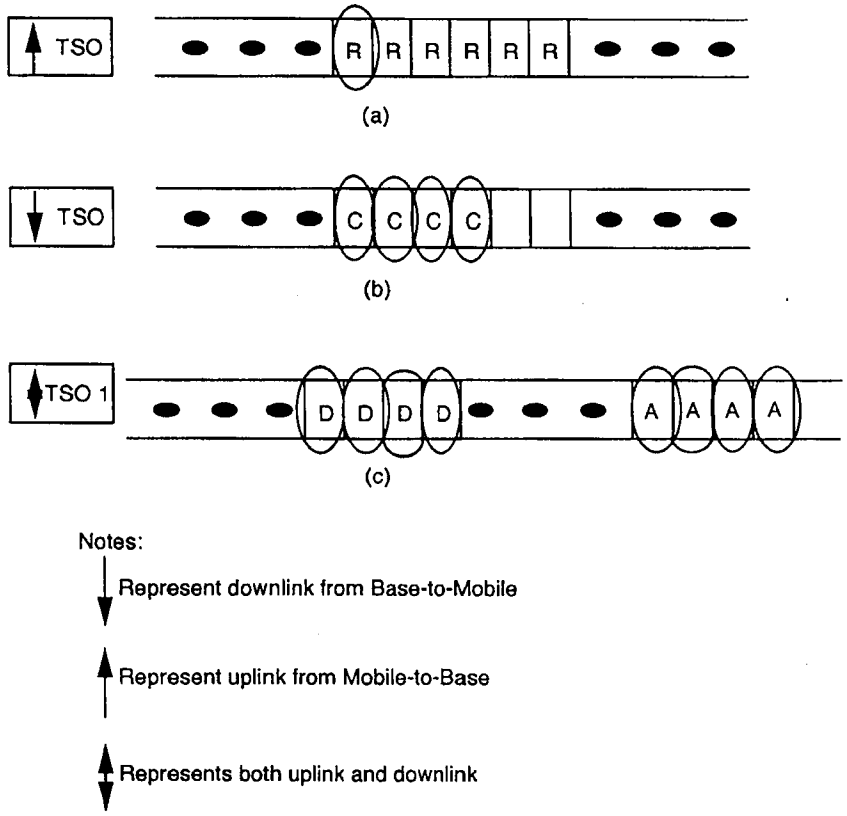

Figure 3.11 Mobile access request for registration.

the GSM system will allocate SDCCH to the mobile via the AGCH (Figure 3.12[c]). It should be noted that since the reverse link can have a contention, the mobile may have to make a second try or even more tries before being successful. For subsequent requests, if necessary, the mobile has to wait for a random amount of time. The system and the mobile will also exchange necessary information to set up the call; for example, authentication, set-up information, measurement reports, and power control on SDCCH/SACCH (Figure 3.12[d]). Lastly, the mobile will be allocated a TCH by SDCCH. The mobile now starts conversation. Details of this are shown in Figure 3.12(e).

Exhibit S

GSM Networks: Protocols, Terminology, and Implementation

GSM Networks: Protocols, Terminology, and Implementation

Gunnar Heine

Artech House
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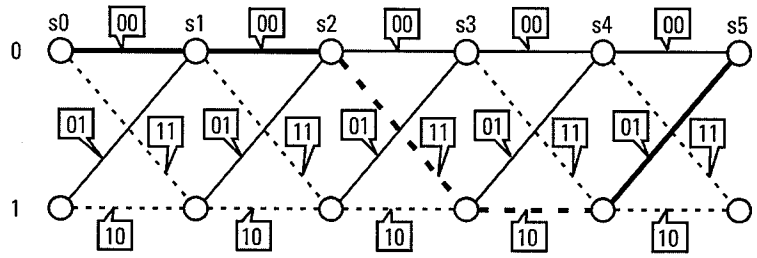

Figure G.23 Trellis diagram.

A CUG is a subset of subscribers of a PLMN (Figure G.24). Typical users of CUGs are companies (e.g., a shipping company) that have employees on the road and want to allow their employees to access the company resources but not have unlimited access to the rest of the network. This creates a kind of virtual private exchange or network. Basically, subscribers that belong to a CUG can communicate only with subscribers of the same group. That applies to calls both to and from a CUG member. The GSM supplementary service closed user group in its basic form restricts users from making any calls outside the CUG and does not allow a user to receive a call from someone outside the CUG. CUG has several options that grant special rights to individual users, like incoming access from non-CUG users or outgoing access to non-CUG users.

Each CUG has an identifier, and a subscriber can be a member of as many as nine different CUGs.

D1, D2 The two GSM 900 networks in Germany. The NDC for D1 is 171, the one for D2 is 172. This information is used in examples throughout this book.

D-interface [GSM 09.02] The interface between VLR and HLR. See Chapter 4.

DCCH [GSM 05.01, 05.02] Dedicated control channel. Generic term to address all bidirectional point-to-point control channels on the Air-interface. An example is the SDCCH.

DCS 1800 Digital Communication System 1800. A GSM system that was ported from the 900 MHz band to the 1800 MHz band. The DCS 1800 has more channels (374), but the protocol and the services are practically identical; only some minor changes to the protocol were made.

Exhibit T

GSM, cdmaOne and 3G Systems. Raymond Steele, Chin-Chun Lee and Peter Gould

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GSM, cdmaOne and 3G Systems

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as location updating are far less than those of speech transmissions. For this reason, a lower data rate channel has been defined which has around one-eighth of the capacity of a full-rate TCH. This channel is known as a *stand-alone dedicated control channel* (SDCCH). The channel is termed 'stand-alone' because it may exist independently of any TCH, and it is termed 'dedicated' because it is only used by one particular MS, i.e. it is dedicated to a particular MS.

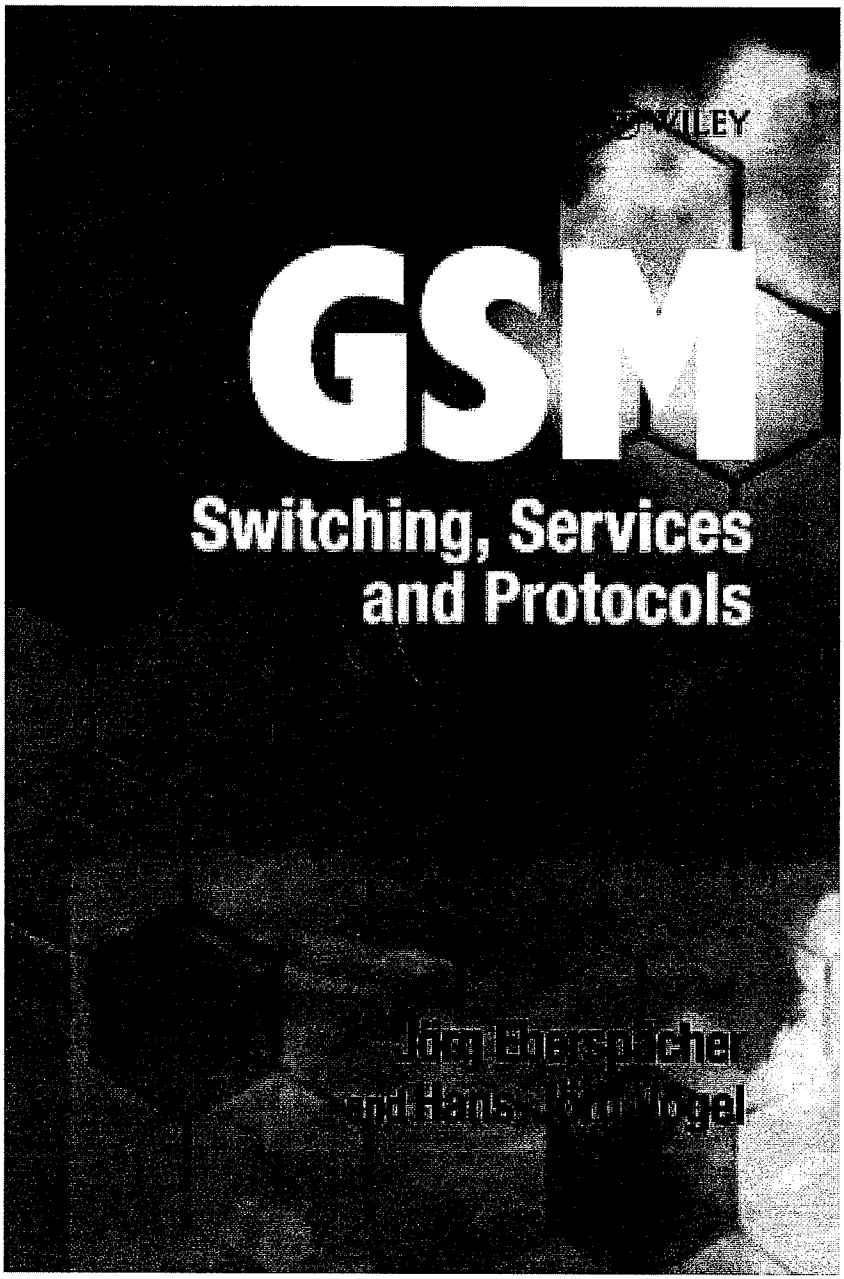
In some ways the SDCCH is similar to a TCH since they are both used to provide a dedicated connection between a BTS and an MS. The SDCCH also has an associated SACCH. Since the SDCCH always carries signalling traffic there is no frame stealing and consequently it does not need an FACCH. Alternatively, one could argue that the SDCCH is constantly in the FACCH mode. The SDCCH operates on both the up-link and down-link and the normal burst is always used.

Common control channels The common control channels may be used by any MS within a cell. The *paging channel* (PCH) is a down-link only channel that is used by the system to page individual MSs, e.g. in the event of an incoming call. There are two different PCHs, a full-rate PCH and a reduced rate PCH, for use in cells with a limited capacity. The normal burst is always used on the PCH.

The *access grant channel* (AGCH) shares the same physical resources as the PCH, i.e. a particular time slot may be used by either channel, though not simultaneously. As its name would suggest, the AGCH is used by the network to grant, or deny, an MS access to the network by supplying it with details of a dedicated channel, i.e. TCH or SDCCH, to be used for subsequent communications. The AGCH is a down-link only channel and it uses the normal burst.

The *random access channel* (RACH) is an up-link only channel that is used by an MS to initially access the network, e.g. at call set-up or prior to a location update. It is termed 'random' because there is no mechanism to ensure that no more than one MS transmits in each RACH time slot and there is a finite probability that two mobiles could attempt to access the same RACH at the same time. This could result in neither access attempt being successful as the two signals collide at the BTS. If an MS receives no response from the BTS, it will attempt to access the BTS again after waiting a certain period of time. If this period of time was the same for every MS, then once a collision occurs between two MSs, it will continue to occur for every subsequent access attempt. Therefore the delay between access attempts is randomised to reduce the likelihood of collisions at the BTS. The MS will always transmit access bursts on the RACH.

Exhibit U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broadcast the same information to all MSs in a cell. The group of Broadcast Channels consists of three channels:

- *Broadcast Control Channel* (BCCH): On this channel, a series of information elements is broadcast to the MSs which characterize the organization of the radio network, such as radio channel configurations (of the currently used cell as well as of the neighboring cells), synchronization information (frequencies as well as frame numbering), and registration identifiers (LAI, CI, BSIC). In particular, this includes information about the structural organization (formats) of the CCCH of the local BTS. The BCCH is broadcast on the first frequency assigned to the cell (the so-called *BCCH carrier*).
- *Frequency Correction Channel* (FCCH): On the FCCH, information about correction of the transmission frequency is broadcast to the MSs; see Section 5.2.2 (frequency correction burst).
- *Synchronization Channel* (SCH): The SCH broadcasts information to identify a BTS, i.e. *Base Station Identity Code* (BSIC); see Section 3.2.9. The SCH also broadcasts data for the frame synchronization of an MS, i.e. *Reduced Frame Number* (RFN) of the TDMA frame; see Section 5.3.1.

FCCH and SCH are only visible within protocol Layer 1, since they are only needed for the operation of the radio subsystem. There is no access to them from Layer 2. In spite of this fact, the SCH messages contain data which are needed by Layer 3 for the administration of radio resources. These two channels are always broadcast together with the BCCH.

The CCCH is a point-to-multipoint signaling channel to deal with access management functions. This includes the assignment of dedicated channels and paging to localize a mobile station. It comprises the following:

- *Random Access Channel* (RACH): The RACH is the uplink portion of the CCCH. It is accessed from the mobile stations in a cell without reservation in a competitive multiple-access mode using the principle of slotted Aloha [4], to ask for a dedicated signaling channel (SDCCH) for exclusive use by one MS for one signaling transaction.
- *Access Grant Channel* (AGCH): The AGCH is the downlink part of the CCCH. It is used to assign an SDCCH or a TCH to a mobile station.
- *Paging Channel* (PCH): The PCH is also part of the downlink of the CCCH. It is used for paging to find specific mobile stations.
- *Notification Channel* (NCH): The NCH is used to inform mobile stations about incoming group and broadcast calls.

The last type of signaling channel, the DCCH is a bidirectional point-to-point signaling channel. An *Associated Control Channel* (ACCH) is also a dedicated control channel, but it is assigned only in connection with a TCH or an SDCCH. The group of *Dedicated/ Associated Control Channels* (D/ACCH) comprises the following:

- *Stand-alone Dedicated Control Channel* (SDCCH): The SDCCH is a dedicated point-to-point signaling channel (DCCH) which is not tied to the existence of a TCH (''stand-alone''), i.e. it is used for signaling between an MS and the BSS when there is no active connection. The SDCCH is requested from the MS via the RACH and assigned via the AGCH. After the completion of the signaling transaction, the SDCCH is released and can be reassigned to another MS. Examples of signaling transactions

which use an SDCCH are the updating of location information or parts of the connection setup until the connection is switched through (see Figure 5.1).

- *Slow Associated Control Channel* (SACCH): An SACCH is always assigned and used with a TCH or an SDCCH. The SACCH carries information for the optimal radio operation, e.g. commands for synchronization and transmitter power control and reports on channel measurements (Section 5.5). Data must be transmitted continuously over the SACCH since the arrival of SACCH packets is taken as proof of the existence of the physical radio connection (Section 5.5.3). When there is no signaling data to transmit, the MS sends a measurement report with the current results of the continuously conducted radio signal level measurements (Section 5.5.1).
- *Fast Associated Control Channel* (FACCH): By using dynamic pre-emptive multiplexing on a TCH, additional bandwidth can be made available for signaling. The signaling channel created this way is called FACCH. It is only assigned in connection with a TCH, and its short-time usage goes at the expense of the user data transport.

In addition to these channels, a *Cell Broadcast Channel* (CBCH) is defined, which is used to broadcast the messages of the *Short Message Service Cell Broadcast* (SMSCB). The CBCH shares a physical channel together with the SDCCH.

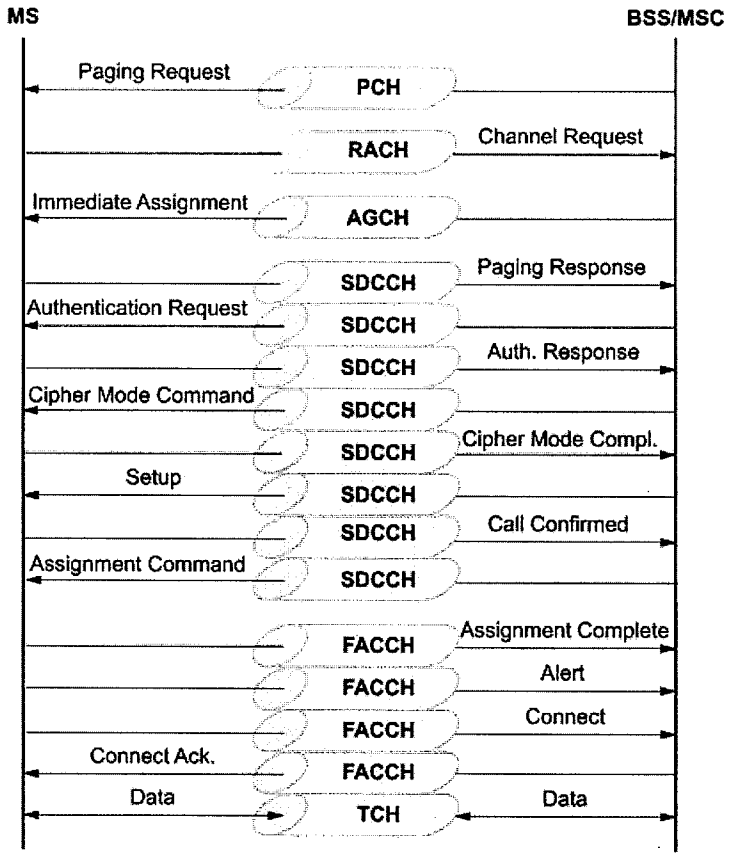

Figure 5.1: Logical channels and signaling (connection setup for an incoming call)

Exhibit V

ETSI TS 144 018 V6.19.0 (2006-09)

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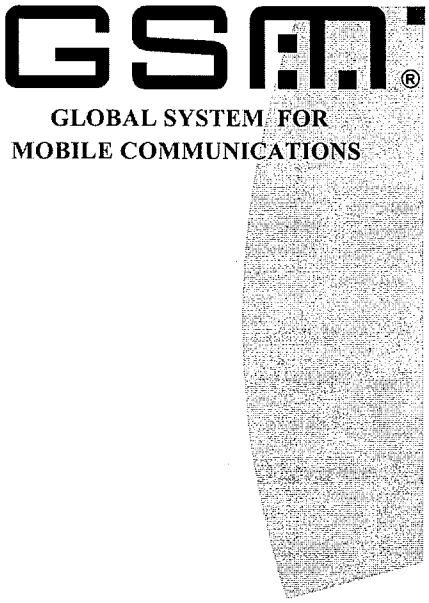
Mobile radio interface layer 3 specification;
Radio Resource Control (RRC) protocol
(3GPP TS 44.018 version 6.19.0 Release 6)**



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Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp .

1.5 Use of logical channels

The logical control channels are defined in 3GPP TS 45.002. In the following those control channels are considered which carry signalling information or specific types of user packet information:

i) Broadcast Control CHannel (BCCH): downlink only, used to broadcast Cell specific information;

ii) Synchronization CHannel (SCH): downlink only, used to broadcast synchronization and BSS identification information;

iii) Paging CHannel (PCH): downlink only, used to send page requests to Mobile Stations (MSs);

iv) Random Access CHannel (RACH): uplink only, used to request a Dedicated Control CHannel;

v) Access Grant CHannel (AGCH): downlink only, used to allocate a Dedicated Control CHannel;

vi) Standalone Dedicated Control CHannel (SDCCH): bi-directional;

vii) Fast Associated Control CHannel (FACCH): bi-directional, associated with a Traffic CHannel;

viii) Slow Associated Control CHannel (SACCH): bi-directional, associated with a SDCCH or a Traffic CHannel;

ix) Cell Broadcast CHannel (CBCH): downlink only used for general (not point to point) short message information;

x) Notification CHannel (NCH): downlink only, used to notify mobile stations of VBS (Voice Broadcast Service) calls or VGCS (Voice Group Call Service) calls.

Two service access points are defined on signalling layer 2 which are discriminated by their Service Access Point Identifiers (SAPI) (see 3GPP TS 44.006):

i) SAPI 0: supports the transfer of signalling information including user-user information;

ii) SAPI 3: supports the transfer of user short messages.

Layer 3 selects the service access point, the logical control channel and the mode of operation of layer 2 (acknowledged, unacknowledged or random access, see 3GPP TS 44.005 and 3GPP TS 44.006) as required for each individual message.

1.6 Overview of control procedures

1.6.1 List of procedures

The following procedures are specified in this Technical Specification:

a) Clause 3 specifies elementary procedures for Radio Resource management:

- system information broadcasting (sub-clause 3.2.2);
- RR connection establishment (sub-clause 3.3):
  - entering the dedicated mode: immediate assignment procedure (sub-clause 3.3.1.1);
  - paging procedure for RR connection establishment (sub-clause 3.3.2);
  - notification procedure (sub-clause 3.3.3).
- Procedures in dedicated mode and in group transmit mode (sub-clause 3.4):
  - measurement report procedure (sub-clause 3.4.1.2);
  - intracell change of channels (sub-clause 3.4.3);
  - intercell change of channels (sub-clause 3.4.4);

A 206

Exhibit W

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,

Plaintiff,

v. Civil Action
No. 05-747

ANDREW CORPORATION,
Defendant.

Videotaped Deposition of
ROBERT J. ANDERSON
Philadelphia, Pennsylvania
TUESDAY, October 24, 2006
9:12 a.m.

CONFIDENTIAL - ATTORNEYS' EYES ONLY

Job No: 25500128
Pages 1-192
Reported By: Christine M. Baird, CRR

A 207

Q I will tell you what my question is and you may want to finish, but maybe not. You have read a couple of them which will probably get you to where my question is.

Is it TruePosition's position that GSM systems have control channels?

A Yes.

Q Do you have an understanding as to what TruePosition believes a control channel is in a GSM system.

A Could you repeat the question?

Q Sure.

MR. PARKS: Could you read it back?

(The reporter read from the record as requested.)

THE REPORTER: QUESTION: Do you have an understanding as to what TruePosition believes a control channel is in a GSM system?

THE WITNESS: Yes.

BY MR. PARKS:

Q What does TruePosition believe a control channel is in a GSM system?

A A control channel in a GSM system would include, at least, the following, the random access channel, the broadcast control channel, the paging and

access grant channel, the standalone dedicated control channel, the slow associated control channel, the fast associated control channel. Those are all that I can think of right now.

Q Do you know what information is carried on the standalone dedicated control channel in the GSM system?

A Yes.

Q What?

A Typically, control or signaling information.

Q What do you mean by control or signaling information?

A Information which is used to setup a call within the network, or information which is used to maintain the status and maintain communication with the mobile station within the network.

Q Anything else?

A Not that I can recall at this time.

Q Do you have an understanding as to what traffic information is?

A No.

Q You referred to before as a voice channel also being referred to as a traffic channel; do you recall that testimony?

A Yes.

Q Did do you have an understanding as to what information is carried over a traffic channel in a GSM system?

A Yes.

Q What information is carried over a traffic channel in a GSM system?

A Typically, information that is carried over a traffic channel within GSM is voice data or circuit switch data.

Q What do you mean by circuit switch data?

A Circuit switch data is a data mode where a user may have a point to point connection from their mobile station to some other entity also connected on the public switch telephone network or PSTN. It is the wireless equivalent of a modem dial up.

Q Is circuit switch data considered voice information?

A No.

Q What is circuit switch data considered if it is not voice information?

MS. MILSARK: Objection, vague.

THE WITNESS: It's data. It's user data.

BY MR. PARKS:

Q What do you mean by user data?

to AOL, for example. When I'm using computer data here, I mean digitized data, data that is not voice information. Anything that is not voice information.

So here's what I'm trying to get at. You used the term user data. I'm trying to understand exactly what you meant by user data and what is considered user data as you are using the term.

A It is really any type of data that a user may want to send, either directly or indirectly through some type of application. It actually could include e-mails, electronic file transfers, it could include video images, and it even could include voice, in voiceover IP type of connections, those types of applications.

Q So if I understand you correctly, user data is carried over a traffic channel in a GSM system; is that right?

A Yes, in general.

Q What do you mean by in general?

A User data, at times, is carried by other channels within the GSM network.

Q What other channels within the GSM network carry user data besides the traffic channels?

A In a GPRS system the user data -- I guess GPRS is probably separate from GSM, really, so that's

probably not relevant.

Q GPRS is considered packet switched; is that right?

A Yes.

Q So you didn't want to add anything about GPRS?

A No.

Q Does the standalone dedicated control channel in a GSM system carry user data?

A At times it can.

Q At what times can a standalone dedicated control channel in a GSM system carry user data?

A The only one that I'm aware of is when an SMS, short message service -- when that is being used, that data can be sent, depending upon the RAN vendor implementation -- can be sent on a number of different channels, one of them being the standalone dedicated control channel.

Q When you say RAN vendor, what are you referring to by RAN vendor?

A Radio access node vendor.

Q Do you mean like the infrastructure provider?

A Yes.

Q Ericsson would be an example of a RAN

vendor?

A Yes.

Q Can a standalone dedicated control channel in a GSM system carry circuit switched data?

A Not that I'm aware of.

Q Can a standalone dedicated control channel in a GSM system carry voice data?

A Not that I'm aware of.

Q Do you know what specific types of user data may be carried over a standalone dedicated control channel in a GSM system?

A Yes.

Q Which types?

A SMS.

Q Anything else?

A Not that I'm aware of.

Q Can you give me an example of an SMS data?

A Yes.

Q What is an example?

A If one mobile user wanted to send another mobile user a text message, that text message would often be sent via SMS.

Q So all the text messaging the teenagers are doing today is considered SMS traffic; is that correct?

A Yes, I believe so.

MS. MILSARK: Mr. Parks, we have been talking about this topic for some time. And I have to confess, I haven't really reviewed the notice in any detail, but I don't see how this is tied into any of the topics in the 30(b)(6) notice, I assume you are going to tie it back at some point. Or can we have an ongoing stipulation that when he is outside the notice he is Rob Anderson and not Mr. TruePosition?

MR. PARKS: I'm getting ready to move off of this anyway, so. It was meant, though, to relate to the 30(b)(6) topics.

BY MR. PARKS:

Q Mr. Anderson, you mentioned three reasons for TruePosition's position that the '144 Patent is not essential IPR. Are there any other reasons, other than the three that you previously mentioned?

A Could you read back the three reasons, please?

MR. PARKS: Sure, could you read them back from the record? If not, I can read them off of here, but the testimony might be a bit more accurate.

BY MR. PARKS:

Q Let me just read them off to you and see if you agree with me. Let me see if I can read them off,

Exhibit X

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TruePosition, Inc.,	)	
	)	
Plaintiff/	)	
Counterclaim-Defendant,	)	
	)	**Civil Action No. 05-747-SLR**
v.	)	
	)	
Andrew Corporation,	)	
	)	
Defendant/	)	
Counterclaim-Plaintiff.	)	
	)	

TRUEPOSITION'S RESPONSE TO
ANDREW'S REQUESTS FOR ADMISSION

Pursuant to Rules 26 and 36 of the Federal Rules of Civil Procedure, TruePosition, Inc., hereby responds and objects to Andrew Corporation's Requests for Admission. TruePosition reserves all objections to the competency, relevancy, materiality, or admissibility at trial of any response to the propounded interrogatories, or to any document produced in response thereto, and reserves the right to amend, modify, or supplement its responses or objections herein, or to move for a protective order.

phrases "control channel" and "control channels" are repeatedly and explicitly recited in the 144 Patent, and otherwise denies the request.

7. SDCCH channels were known as of the May 7, 1993 filing date of the application that led to the `144 patent.'

RESPONSE:

TruePosition objects to this request because the phrase "were known" renders the request vague.

Subject to the foregoing objections, TruePosition admits that Standalone Dedicated Control Channels were known among some individuals as of the May 7, 1993 date of the application that led to the '144 Patent.

8. SDCCH channels in a GSM system were known as of the May 7, 1993 filing date of the application that led to the `144 patent.

RESPONSE:

TruePosition objects to this request because the phrases "GSM system" and "were known" render the request vague.

Subject to the foregoing objections, TruePosition admits that Standalone Dedicated Control Channels in a GSM cellular network were known among some individuals as of the May 7, 1993 filing date of the application that led to the 144 Patent.

9. The term "DCCH" does not appear anywhere in the `144 patent.

RESPONSE:

TruePosition objects to this request as seeking information that is not relevant to the claim or defense of any party.

72. The Kono reference's Application Filing Date was February 16, 1990 (see Exhibit F).

RESPONSE:

Admitted. For clarity, TruePosition avers that it does not agree that Exhibit F is an accurate English translation of Exhibit E.

73. The Kono reference's Laid-Open Publication Date was October 24, 1991 (see Exhibit F).

RESPONSE:

Admitted. For clarity, TruePosition avers that it does not agree that Exhibit F is accurate English translation of Exhibit E.

Dated: October 30, 2006

/s/ Daniel J. Goettle

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CERTIFICATE OF SERVICE

I, Daniel J. Goettle, hereby certify that on this 30th day of October, 2006, I served the foregoing TruePosition's Response to Andrew's Requests for Admission:

Via Electronic Mail, Return Receipt Requested

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/s/ Daniel J. Goettle
Daniel J. Goettle

Exhibit Y

08/059,248

DOCKET NO.: ACOM-0001 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Louis A. Stilp; Curtis A.Knight; John C. Webber

Serial No.: **Not Yet Assigned** Group No.:

Filed: **Herewith** Examiner:

For: **CELLULAR TELEPHONE LOCATION SYSTEM**

I, Michael D. Stein, Registration No. 34,734 certify that this correspondence is being deposited with the U.S. Postal Service as First Class mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

On 5-7-93

Michael D. Stein

Michael D. Stein Reg. No. 34,724

Commissioner of Patents & Trademarks
Washington, DC 20231

Sir:

INFORMATION DISCLOSURE STATEMENT
SUPPORTING PETITION TO MAKE SPECIAL

The following detailed discussion of the references listed on the attached Form PTO-1449 particularly points out how the claimed subject matter is distinguished over the references. One copy of each of the references listed on the Form PTO-1449 is submitted herewith.

The article entitled "Passive Location of Mobile Cellular Telephone Terminals" discusses the need for a method of locating a moving or stationary mobile cellular telephone. In particular, this paper discloses the basic concepts of determining range information from the phase of SAT signals or the RF signal amplitude, and determining angles of arrival by an interferometric approach. This paper fails to disclose sufficient detail to enable one to produce a working system. Moreover, this paper lacks disclosure of the concept of monitoring control channels to obtain data from which the locations of mobile

cellular telephones are determined. Furthermore, this paper lacks disclosure of the claimed apparatus and methods for obtaining location information from the weak, short duration control channel signals. For example, this article neither discloses nor suggests a cellular telephone location system comprising (see applicants' claim 1):

> (a) at least three cell site systems, each cell site system comprising: an elevated ground-based antenna; a baseband convertor operatively coupled to said antenna for receiving cellular telephone signals transmitted over a control channel by said cellular telephones and providing baseband signals derived from the cellular telephone signals; a timing signal receiver for receiving a timing signal common to all cell sites; and a sampling subsystem operatively coupled to said timing signal receiver and said baseband convertor for sampling said baseband signal at a prescribed sampling frequency and formatting the sampled signal into frames of digital data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said cellular telephone signals were received; and
>
> (b) a central site system operatively coupled to said cell site systems, comprising: means for processing said frames of data from said cell site systems to generate a table identifying individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell site systems; and means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.

U.S. Patent No. 5,008,679 (Effland et al.) discloses a satellite-based system for locating an interfering transmitter. This patent lacks any disclosure related to cellular telephones; moreover, it fails to teach or suggest the desirability of locating a cellular telephone.

U.S. Patent No. 4,740,792 (Sagey) discloses a satellite-based vehicle location system including vehicle-mounted radio frequency transmitters and elevated (satellite-based) relay stations that receive transmitted signals from the vehicle-mounted transmitters and relay such signals to a central processing station. The central processing station separates the

relayed signals from one another and encodes the time of arrival at the processing station onto the received signals and then determines from time differences of arrival the location of the associated transmitters. The means for separating the relayed signals from one another include means for correlating the synchronization data encoded into the synchronization symbol of each signal with a corresponding stored code to enable the system to identify the beginning of individual signals. Applicants respectfully note that his patent fails to teach or suggest a ground-based system locating cellular telephones as described in applicants' claims. In particular, there is no teaching or suggestion of monitoring control channel transmissions or of the claimed apparatus and methods to achieve such monitoring. It should be noted that Sagey discloses correlating the synchronization data encoded into each signal with a corresponding stored code. Applicants respectfully submit that this disclosure of correlating a synchronization code with a stored code does not teach or suggest applicants' claimed system which, in preferred embodiments (see claim 3), cross-correlates a frame of data corresponding to one cell site with corresponding (in terms of time) frames of data from each other cell site.

U.S. Patent No. 5,023,900 (Tayloe) discloses a system for diagnosing a cellular radio telephone system. This patent does not disclose or suggest a system for locating cellular telephones. U.S. Patent No. 5,095,500 is a continuation of U.S. Patent No. 5,023,900.

U.S. Patent No. 5,166,694 (Russell et al.) discloses a vehicle location system that processes time of arrival signals to produce a geometric dilution of precision (GDOP) table at periodic intervals. Time of arrival signals are then prefiltered to determined an

optimum subset of data for further processing. This patent neither teaches nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited in applicants' claims.

U.S. Patent No. 5,003,317 (Gray et al.) discloses a stolen vehicle recovery system employing direction-finding (DF) to measure the bearing from each receiver to a stolen vehicle. This patent fails to teach or suggest a cellular telephone location system employing control channel signals to determine the locations of mobile cellular telephones.

U.S. Patent No. 4,870,422 (Counselman, III) discloses a system for determining a baseline vector between a pair of survey marks on the ground by radio interferometry using radio signals broadcasts from satellites. This patent fails to teach or suggest a cellular telephone location system.

U.S. Patent No. 4,791,572 (Green, III et al.) discloses a method for displaying positional information on a map. This patent does not teach or suggest a system for locating a cellular telephone.

U.S. Patent No. 4,177,466 (Reagan) discloses an auto theft detection system that employs a measurement of signal strength or, alternatively, a radio direction finder signal. This patent neither teaches nor suggests a system for locating cellular telephones.

U.S. Patent No. 4,651,157 (Gray et al.) discloses a system for locating a vehicle. The system employs an on-board security system that includes a LORAN-C receiver and a two-way full duplex transmitting radio in communication with a central station. This patent neither teaches nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited

in applicants' claims.

U.S. Patent No. 4,742,357 (Rackley) discloses a radio location system employing a network of receivers, a base station, and an object unit associated with the object to be located. The object unit receives locate request messages and echo pulses transmitted by the base station. In addition, the object unit has a variable frequency transmitter for transmitting messages and relaying the received echo pulses. This patent neither discloses nor suggests a system for locating cellular telephones by monitoring control channels, nor does it teach or suggest the apparatus and methods recited in applicants' claims.

U.S. Patent No. 4,926,161 (Cupp) discloses a method for avoiding slow play on a golf course. The disclosed method includes monitoring the location of golf course carts as they travel through a golf course. This patent lacks disclosure of a system for locating cellular telephones.

U.S. Patent Nos. 4,818,998 and 4,908,629 (Apsell et al.) disclose a vehicle location system which employs transponder- or transceiver-equipped stolen vehicles and appropriately-equipped police direction-finding tracking vehicles. The tracking vehicles "home in" on periodical transponder reply radio transmissions activated by command activation signals. These patents neither disclose nor suggest a system for locating cellular telephones by monitoring control channels.

U.S. Patent No. 4,728,959 (Maloney) discloses a system for locating a mobile radio transmitter located in a service area of a cellular telephone system. In particular, the disclosed system employs phase angle measurements indicative of the angle of direction of a

mobile transmitter from each of a plurality of land stations and processes theses phase angle measurements to locate the mobile transmitter. The phase angle measurements are obtained by translated Hilbert transformations and are processed to produce a probability density function. The probability density functions are combined after a Chi-squared analysis to produce an area of uncertainty representing the position of the mobile transmitter. Processing units at the land stations determine complex phaser relationships between the antenna elements that represent the conjugate product of the signals in the two antenna elements corresponding to the phase of the radio signals in each antenna element and the direction angle to the mobile transmitter from the land station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,651,156 (Martinez) discloses a radio location system comprising a single broadcast station and two fixed receivers. According to the disclosed system, hand-held or vehicle-borne radio locator-transmitter devices transmit their positions and identities to the centrally located fixed receivers. Each of the locator transmitter devices is continuously phase-locked to the RF carrier broadcast by a nearby broadcast station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,891,650 (Sheffer) discloses a system for locating a selected vehicle from which an alarm signal is generated. The disclosed system includes a fixed array of cellular sites each having signal detecting and generating units capable of receiving an input alarm signal having a signal strength which is a function of the distance between the

vehicle generating the alarm signal and the signal-detecting unit. The alarm signal includes a pulse signal which identifies the subscriber or the vehicle. U.S. Patent No. 5,055,851 is a continuation of U.S. Patent No. 4,891,650. Neither of these patents disclose or suggest monitoring control channel transmissions.

U.S. Patent No. 4,596,988 (Wanka) discloses a tracking system that, when interrogated, reports the location of a missing article. The disclosed system employs a concealed radio receiver 12 coupled to a trackable transmitter 14, and a network of remote receiving stations 18. The remote receiving stations each contain an automatic direction finder (ADF). The receiving stations 18 each receive a signal from the hidden transmitter and determine the bearing relative to the location of the individual receiving station, and transmit this bearing information via a modem to a base station 22. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 4,433,335 (Wind) discloses a system for determining the location of a transmitter. The disclosed system comprises at least two spaced receivers for receiving electromagnetic signals from the transmitter to be located and means for Fourier transforming the received signals and representing the transformed signals as complex functions of frequency. A complex division of pairs of the signals is performed to obtain signals represented by the phase differences between pairs of signals as functions of frequency. The difference in phase between pairs of signals as a function of frequency is employed to determine the time differences existing between the same pairs of functions. From these time differences, the position of the transmitter is determined. This patent lacks

any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 5,023,809 (Spackman et al.) discloses a system that tracks the position of a vehicle in which an oscillator/transmitter pair is positioned. At least three translators receive the signals transmitted from the target and each retransmits the signal to a base receiving station. The base receiving station also receives the signal sent from the target and compares each of the signals received from the translator with the signal sent directly from the target. The output of the comparator purportedly provides an indication of the position of the target relative to the base receiving station. This patent lacks any disclosure or suggestion of an apparatus or method for determining the location of a mobile cellular telephone by monitoring control channel transmissions.

U.S. Patent No. 3,384,891 (Anderson) discloses a radio navigation system employing satellites or aircraft.

U.S. Patent No. 4,975,710 (Baghdady) discloses a system for performing direction of arrival (DOA) measurements. The disclosed system employs long-baseline, phase-difference, paired-antenna interferometry and DOA-computing array processing algorithms.

U.S. Patent No. 4,888,593 (Friedman et al.) discloses a system employing cyclic cross-correlation to perform direction-finding on a radio signal modulated by a digital signal and existing in a heavy interference environment.

U.S. Patent No. 4,297,701 (Henriques) discloses a range finding system for use on a golf course.

U.S. Patent No. 4,797,679 (Cusdin et al.) discloses a system for determining the direction of incidence of signals from a distant source. In particular, the patent is directed to providing an improved short-baseline time difference of arrival direction-finding system.

U.S. Patent No. 4,639,733 (King) discloses an interferometer-type direction finding system employing an array of five antennas arranged, respectively, at the apices of a regular pentagon.

U.S. Patent No. 4,638,321 (Drogin) discloses a wide baseline interferometer employing a pair of receivers 42, 44 and a common local oscillator 46.

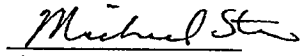
These patents lack any disclosure or suggestion of a system or method for locating mobile cellular telephones by monitoring control channel signals and processing such signals to obtain location information. As discussed in applicants' specification, there are numerous advantages provided by monitoring control channels to track the locations of cellular telephones. First, a voice channel is an expensive and relatively scarce resource. Cellular systems typically require approximately six to eight seconds to allocate a voice channel to a specific telephone. If voice channels were employed for location tracking, the cellular telephone would have to be called and commanded to initiate a voice channel call every time a location sample were to be taken. This would be both expensive and time consuming. Thus, it would be extremely inefficient for a location system to require the telephone to initiate periodic voice channel transmissions. Second, each voice channel transmission adds a call record in an associated billing system. Therefore, a large burden would be placed on the billing system if the location system were to require periodic voice

channel transmissions. In contrast, control channel transmissions already occur periodically in cellular systems. Thus, the present invention is compatible with existing cellular telephone protocols and would not require the cellular system or the individual cellular telephones to be modified. Third, since the frequency of control channel transmissions is software controllable, a location system in accordance with the present invention could control the frequency of control channel transmissions and offer different subscribers different location information update rates. Fourth, another advantage afforded by monitoring control channel transmissions is in connection with energy efficiency. Control channel transmissions are very short and require little power in comparison to voice channel transmissions. Accordingly, requiring periodic voice channel transmissions would cause a significant battery drain in the individual cellular telephones. This is avoided by monitoring control channels.

For all of the foregoing reasons, applicants' respectfully submit that the claimed subject matter is patentable over the prior art.

Respectfully submitted,

Date: May 3, 1993



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